preventing GREENBUG OUTBREAKS

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PREVENTING GREENBUG OUTBREAKS

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The GREENBUG[1] sometimes called the spring grain aphid, is a pest of small grains and sorghum in the Central and Southeastern States. It causes some damage every year, and several severe outbreaks have occurred.

The first reported infestation of this insect in the United States was in Virginia in 1882. Since then, at least 18 outbreaks have occurred. The most serious one hit Texas and Oklahoma in 1942. More than 61 million bushels of grain valued at $38 million were lost.

Again, in the spring of 1950, this insect severely damaged barley, oats, and wheat in northern Texas, western Oklahoma, and in some parts of Colorado, Kansas, and Nebraska. More than 1,500,000 acres were abandoned and the yield on many other acres was greatly reduced. In the previous year, there was severe damage in the Great Plains from Nebraska to southern Canada.

Other severe outbreaks happened in 1951, 1959, and 1961. Then in the fall of 1970, a severe outbreak occurred on winter wheat for the first time in Washington State.

For years, the greenbug has frequently been found on sorghum; yet, it was not considered a major pest until 1968. In this year throughout the Great Plains, greenbugs increased on sorghum, including broomcorn, to such an extent that late plantings were killed. Large plants had up to nearly 40,000 aphids per plant.

DAMAGE

The greenbug sucks sap from grain plants and, during feeding, injects a toxic substance into the plant. This substance turns the leaves yellow. In heavy infestations, the leaves soon wither and the plants die. The insects then leave these plants and move on to others. In addition to the damage it causes, the greenbug is an effective vector (or carrier) of virus diseases of small grains, corn, sorghum, and several wild grasses.

In the winter-wheat belt, greenbug damage may be first noticed in fall or winter. Often, however, damage is not noticed until spring when spots of dead plants a few feet in diameter appear in the field.

On close examination, distinct degrees of injury are evident. Surrounding the area of dead plants are heavily infested and badly damaged living plants. Most of these

[1] *Schizaphis graminum*, grain

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Field of winter oats showing greenbug injury.

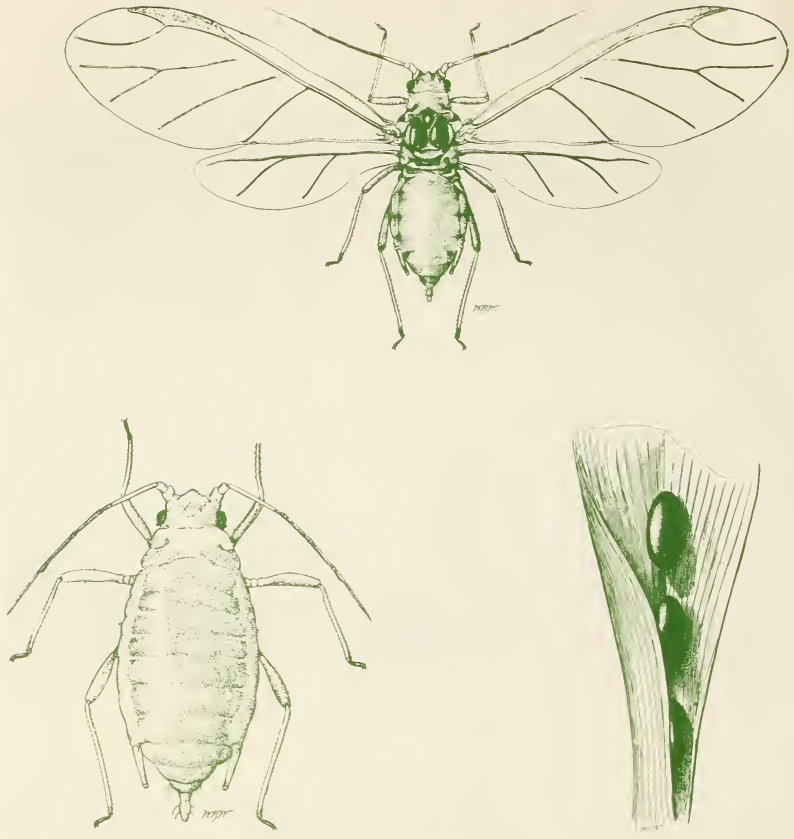
living plants have lost most of their green color. Beyond these are plants showing less damage. As the infestation spreads, the spots of dead plants become larger and may join together so that large portions of a field are affected. Even if these spots do not appear, an entire field of fall-planted grain may become infested with swarms of migrating greenbugs.

Damage to sorghum is usually worse on small plants where greenbug feeding can cause discoloration of leaves. If the infestation is sufficiently heavy, the plants die. Greenbugs usually buildup on the under surface of the lower leaves, but when reproduction increases, the pest can infest the entire above-ground portion of the plant. Maturing plants can have large populations of greenbugs in the sorghum heads.

DESCRIPTION

Greenbugs can be winged or wingless. All the wingless types are females, and most of these give birth to living young. In the Southern States, except in high altitudes, they reproduce continuously throughout the year.

Further north, there is some overwintering of the wingless females, but these reproduce little during the winter. Outbreaks in the spring are thought to be caused by winged females moving into northern areas



Winged and wingless forms of the adult greenbug, and greenbug eggs deposited on a leaf. Greatly enlarged. (Webster and Phillips)

on wind currents from the south. Winged greenbugs are common during some times of the year. The shiny, black eggs of the winged greenbug may be numerous in the fall and spring. However, the importance of sexual reproduction in the life history of greenbugs is not known, because the development of their eggs has not been observed.

When greenbugs first emerge, they are pale green; when full grown, they have a dark-green stripe down the back. From 6 to 30 days (the number of days depends on temperature) after the females hatch, they give birth to young that may develop into either winged or wingless adults. The female continues to reproduce for 20 to 30 days, and produces 50 to 100 progeny. In Indiana, there may be 20 generations a year; in Texas and Oklahoma, even more.

Until recently all greenbugs were thought to be the same, but now at least 3 different types are known. These types are distinguished by

their damage to different varieties of plants, by differences in reproduction at high and low temperatures, and by slight differences in colorations on certain regions of the body. The most recently discovered type is highly injurious to sorghum and small grains. Commonly called the sorghum greenbug, it can reproduce at relatively high temperatures. which may partly account for its success on sorghum.

NATURAL CONTROL

With their rapid rate of reproduction, enough greenbugs could develop in a single season to destroy all the plants on which they feed, if their numbers were not kept down by unfavorable weather and natural enemies.

Greenbugs can reproduce and develop at temperatures from 40° to 100° F., but reproduce most rapidly between 70° and 75° F. Most serious outbreaks of this insect have occurred when the previous summer was cool and moist. with below normal temperatures and above normal moisture. However, when the temperature goes as low as 5° F. or as high as 107° F., most may be killed. Yet. the sorghum greenbug can withstand higher and lower temperatures than previously thought possible for greenbugs.

Greenbug populations are also held in check by a small wasp, *Lysiphlebus testaceipes.*

This wasp is usually present where greenbugs are abundant. It lays its eggs in the greenbug's body, and the hatched maggots eat out the body and emerge as adults through holes they cut in the host shell.

These wasps reproduce much more slowly than greenbugs when the temperature is below 65° F. Consequently, during long periods of cool weather, the greenbug is able to increase to enormous numbers without much interference from the wasps. This relationship between the two insects apparently is responsible for greenbug outbreaks in years when a cool spring follows a mild winter.

Late in the growing season, lady beetles are also frequently found in fields heavily infested with greenbugs. Lady beetles are energetic feeders on aphids. but they often enter a field after economic damage has taken place. Efforts to introduce lady beetles into fields earlier, before crops have been damaged, have not been successful.

Lacewings are also beneficial insects that destroy large numbers of greenbugs. Lacewings lay eggs on long slender stems attached to plants. The spindle-shaped larvae that hatch from the eggs are energetic feeders on greenbugs. Other important predators of greenbugs include damsel bugs, syrphid fly larvae, and several species of spiders.

CULTURAL CONTROL

In some areas, the greenbug depends on volunteer grain and a number of species of wild grasses for its existence from the time the grain is harvested until the next crop is above ground. A most important control measure. therefore. is to destroy volunteer grains and wild grasses by disking. plowing.

clean fallowing, and other cultural measures that will not cause soil erosion. Preventing the growth of volunteer small grains is especially important in Texas and Oklahoma because serious outbreaks that occur there tend to sweep northward.

Cultural measures that will stimulate the growth of plants and enable them to withstand greenbug damage include the use of good seed of recommended varieties, careful preparation of seedbeds, regulation of soil moisture, crop rotation, and use of sufficient fertilizer.

Fall-sown barley, oats, and wheat are more severely injured if planted after grain sorghums, than after soybeans, corn, or wheat. When small grains are rotated with legumes, they are less injured than in continuous plantings. Fall-sown oats have produced a fair crop in areas where spring-sown oats were completely destroyed by greenbugs.

CONTROL WITH RESISTANT PLANTS

Growing greenbug - resistant grains and sorghums is an excellent way of preventing greenbug outbreaks without direct cost or increased effort.

Greenbug resistance can be bred into plants having high yield and quality. Will, Era, and Kerr barleys, for example, are now grown widely and require no control of greenbugs with insecticides.

Resistance to greenbugs has also been found in rye, oats, grain sorghum, and broomcorn, but breeding has not yet progressed sufficiently for commercial release of seeds. No satisfactory resistance has been found in wheat. At present, plant breeders are trying to transfer greenbug resistance from rye to wheat.

Check with your local Agricultural Extension Service for the latest information on greenbug-resistant lines.

CONTROL WITH INSECTICIDES

When other controls are inadequate, insecticides can be used to suppress greenbug outbreaks. Early in the spring, when plants are small, a resistant selection is not being grown, and there are few parasites or predators, an insecticide should be applied as soon as any injury is noticed. Parathion and some other phosphorus-containing insecticides are the most effective for this purpose. Later in the season, natural enemies may control even a heavy infestation in a few days, so that no insecticide is needed.

During past outbreaks, parathion has provided excellent control of greenbugs. However, use only ethyl parathion on sorghum, because methyl parathion can cause severe leaf burning. Consult the following guide for information on insecticide use.

Trade names are used in this publication solely for the purpose of providing specific information. Mention of a trade name does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture or an endorsement by the Department over other products not mentioned.

Insecticide	Crop	Active (ounces) ingredient per acre
Carbophenothion (Trithion)	Sorghum	8 (Texas only.)
Dimethoate (Cygon)	Wheat	2 to 5 (Texas, Oklahoma, Kansas only.)
Disulfoton (Di-Syston)	Wheat	4 to 14 (Oklahoma, Texas, South Dakota only.)
Malathion	Barley, oats, rye, wheat, sorghum	15.
Methyl parathion	Barely, oats, wheat	4 to 8.
Parathion	Barley, oats, wheat, sorghum	4 to 8.
Phorate	Sorghum	16.

The amount of active ingredient needed to control greenbugs depends on temperature at the time of treating, type of crop infested, stage of plant growth, and method of insecticide application. The method of application may also determine the type of insecticide formulation.

Emulsifiable concentrates mixed with water are the most common formulation used for greenbugs. Emulsions can be prepared with as little as 1½ to 2 gallons of water per acre for applications by airplane. However, at least 8 gallons per acre are necessary for use in ground sprayers. Soil treatments with systemic insecticides have also been effective.

In recent years, the recommendation and approval of insecticides for use on small grains and sorghum have changed rapidly and may vary from State to State. For the latest information, consult your local Agricultural Extension Service.

PRECAUTIONS

Insecticides should be prepared and handled according to the directions on the container. Dosages and waiting periods before harvesting or feeding to livestock should be closely followed. *Some of the insecticides recommended for greenbug control should be applied only by trained operators and never with hand equipment.*

All these insecticides are toxic to man and livestock. Although they vary somewhat in their toxicity, they must all be handled with great care, and only by persons experienced in handling and applying poisonous chemicals. All precautions printed on the containers should be strictly observed.

These insecticides must not be in-

haled or allowed to come in contact with the skin. Operators exposed to sprays containing parathion or other equally dangerous insecticides should wear face masks equipped with cartridges of a type approved by the U.S. Bureau of Mines, supplemented with aerosol filters. When these masks are in continuous use, the cartridges should be changed every 8 hours. The filters should be changed whenever breathing through them becomes difficult.

Clothing on which any poison is spilled should be removed immediately and washed with soap and water. If the insecticide comes in contact with the skin, it should be washed off at once with soap and water.

If a person has headache or nausea, the pupils of his eyes become contracted, or he shows any other signs of illness from handling these insecticides, he should be taken to a doctor at once.

Avoid drift of insecticides as much as possible and limit application of insecticides to the target area. To prevent damage to fish, birds, and other animals, be careful not to contaminate streams, lakes, marshes, and grazing or browsing areas by improper application or excessive drift of insecticides.

Many insecticides are hazardous to honey bees and other pollinating insects. If possible, apply insecticides during hours when the bees are not visiting plants. Avoid drift of insecticides into bee yards and adjacent crop or wild plants in bloom. Do not apply insecticides in the vicinity of apiaries that are near enough to be adversely affected. Notify the beekeeper so he can move the hives, if necessary.

Do not clean spray equipment or dump excess spray material in or near streams or other water areas where drainage could contaminate water.

Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the Federal Environmental Protection Agency, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

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